

DEVELOPMENT MATHEMATIC MODULE OF QUADRILATERAL AND TRIANGLE MATERIAL FOR STUDENTS

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ABSTRACT

The availability of teaching materials based on the 2013 curriculum to facilitate students to self-study actively and independently is still limited. The quadrilateral and triangle material math modules are some of the alternative teaching materials used to actively facilitate active learning. This study aims to develop a quadrilateral and triangle material mathematical module for students of class VII SMP / MTs based on the 2013 curriculum and know the feasibility of modules developed based on material experts, media experts, and student responses. This research type is the research of development, in the form of math material module of quadrilateral and triangle for class VII student of Junior High School (SMP/MTs) based on curriculum 2013. In developing this module, the researcher refers to the model development of ADDIE covering five stages: analysis, design, Development, Implementation, and Evaluation. The instruments used in this research are the assessment sheets for the material expert, the assessment sheet for the media expert, and the student response questionnaire. This study's subjects are material experts, media experts, and students of SMP Negeri 15 Yogyakarta and MTs Muhammadiyah Karangajen. Data collection technique collection in the form of interviews and questionnaires. The results of this research and development show that the module. The mathematics developed included in the category is very well based questionnaire assessment by a material expert with a score of 136,67; Questionnaire assessment by experts media with a score of 126,33; and average student response results in this study is 130,05. The assessment results show that the mathematics module quadrilateral and triangular materials for grade VII students of SMP / MTs based on the 2013 curriculum are worthy of use in the learning process.

Keywords: Mathematical Module, Curriculum 2013, ADDIE, Quadrilateral, and Triangle

INTRODUCTION

Indonesia requires Human Resources (HR) in sufficient numbers and quality as the prominent supporters in development. To fulfill these Human Resources, education has a significant role. One of the demands and challenges facing the world of education at present and in the future is that education should produce human resources that have complete competence, namely attitude competencies, knowledge competencies, and integrated skills competencies. The 2013 curriculum is a competency-based curriculum by strengthening learning and authentic assessment to achieve competency attitudes, knowledge, and skills. Strengthening the learning process is done through a scientific approach, which encourages students to observe, ask questions, try/collect data, associate/reason, and communicate. Learning orientation in the context of the 2013 curriculum is to produce Indonesian people who are productive, creative, innovative, and effective through strengthening attitudes (know-why), skills (know-how), and knowledge (know-what). It is stated in Government Regulation number 32 of 2013 article 19 that reads as follows: Each education unit plans the learning process, implements the learning process, evaluates the learning outcomes, and supervises the learning process for the implementation of an effective and efficient learning process.

Effective and efficient learning requires innovative, varied, interesting, contextual, and most crucial teaching material that must be by the level of students' level of needs. One of the teaching materials used by teachers to support the learning process is a module. Using modules, it is hoped that students will become active and independent of absorbing and remembering more about what they have

learned. As part of the learning resources, the modules must be arranged systematically to support creating an environment/atmosphere that allows students to learn.

Based on the results of an interview with a mathematics teacher at SMP Negeri 15 Yogyakarta, information was obtained that in learning mathematics, the teaching material used was in the form of a mathematics book published by the Ministry of Education and Culture (Kemendikbud). The availability of mathematics teaching materials that can facilitate students' learning independently and independently is minimal. The unavailability of teaching materials using a scientific approach. At this junior high school, the teacher said no mathematics teacher had developed teaching materials in mathematics learning modules using a scientific approach.

Interviews were also conducted at MTs Muhammadiyah Karangajen. From the interview results with one of the seventh-grade mathematics teachers, information was obtained that the teaching materials used were textbooks in mathematics learning. The school has also provided mathematics books published by the Ministry of Education and Culture. However, the use of textbooks is not optimal because of the limited number of textbooks available. Not all students have textbooks. Other reference books by the 2013 curriculum are not yet available. No mathematics teacher has developed a mathematics learning module with a scientific approach.

Researchers also conducted interviews with several students in the two schools. From the interview results obtained information that mathematics is a problematic subject compared to other subjects. They also said that not all students were given textbooks because two children only got one textbook. The limited learning resources available at school also make it difficult for students to learn.

Based on the description, the purpose of this research is: 1) To develop a rectangular and triangular material mathematics module for grade VII students of SMP / MTs based on the 2013 curriculum. 2) To determine the feasibility of rectangular and triangle material mathematics modules for VII grade students of SMP / MTs based on the 2013 curriculum.

METHODS

The development model used in this research is Developmental Research. The steps used in this study are research design models that follow the ADDIE development model. According to Benny A. Pribadi (2009: 125), this development model consists of five main phases or stages, namely Analysis, Design, Development, Implementation, and Evaluation. Subjects in this development research were material experts, media experts, VII grade students of SMP Negeri 15 Yogyakarta, and students of MTs Muhammadiyah Karangajen. Types of data in the form of qualitative data and quantitative data. This research development uses data collection techniques, namely: interviews and questionnaires.

This study's data analysis technique is a qualitative descriptive analysis technique that describes product development results in modules.

- a. Descriptive Analysis Process
 1. Collecting data
 2. Data reduction
 3. Display data
 4. Verification and interpretation of data

- b. Questionnaire Analysis Process

From the data that has been collected, the average can be calculated using the formula:

$$\bar{X} = \frac{\sum_{i=1}^n x_i}{n}$$

Information:

$$\begin{aligned} \bar{X} &= \text{Average score} \\ \sum_{i=1}^n x_i &= \text{Total score} \\ n &= \text{Number of assessors} \end{aligned}$$

Furthermore, the data obtained from media experts, material experts, and VII grade students are converted into qualitative values based on the ideal assessment criteria of Sukarjo (2006: 53). The provisions of the ideal evaluation criteria are shown in the following Table 1.

Table 1. Criteria for Ideal Rating Categories

Formulas	Classification
$X > \bar{X}_i + 1,8 SB_i$	Very good
$\bar{X}_i + 0,6 SB_i < X \leq \bar{X}_i + 1,8 SB_i$	Good
$\bar{X}_i - 0,6 SB_i < X \leq \bar{X}_i + 0,6 SB_i$	Enough
$\bar{X}_i - 1,8 SB_i < X \leq \bar{X}_i - 0,6 SB_i$	Less
$X \leq \bar{X}_i - 1,8 SB_i$	Very less

RESULTS AND DISCUSSION

Test Data

1. Analysis
 - a. Analysis of teaching material requirements. In determining the analysis of teaching material needs, observations and interviews were conducted with teachers of SMP Negeri 15 Yogyakarta and MTs Muhammadiyah Karangkajen.
 - b. Material analysis. The materials that will be developed in this module are rectangles and triangles.
 - c. Curriculum analysis. Curriculum analysis is carried out by conducting a literature study, which includes analysis of the subject matter, Core Competencies, Basic Competencies, and indicators that must be achieved by students in learning.
2. Design
 - a. Outline the contents of the module
 - b. Compilation of module content designs
 - c. Develop module assessment instruments. The next step is to arrange the assessment instrument for material experts, media experts, and questionnaires for student responses to the module. The questionnaire consisted of 5 answer choices with a score of 5, 4, 3, 2, and 1, respectively.
3. Development
 - a. Reference Collection
 - b. Module writing
 - c. Validation and valuation
 - d. Trial small classes
4. Implementation. After the learning module's development phase is completed, the next step is applying the learning module to the actual classroom conditions in learning mathematics. An extensive class test is a final test in this development process.
5. Evaluation.

Three material experts assessed the learning material's feasibility: Ahmad Dahlan University Mathematics Education lecturer, a mathematics teacher at SMP Negeri 15 Yogyakarta, and mathematics teacher at MTs Muhammadiyah Karangkajen as in Table 2.

Table 2. Results of the Expert Questionnaire Calculation Results

No.	Assessment	Score	Qualitative Criteria
1.	Mathematics Education Lecturer	145	Very good
2.	Middle School Mathematics Teacher	145	Very good
3.	MTs Mathematics Teacher	120	Good
	Amount	410	
	Average	136,67	Very good

The results above indicate that the module, in terms of the material's feasibility included in the criteria, means the module is suitable for learning mathematics.

Three media experts assessed the feasibility of instructional media: Ahmad Dahlan University Mathematics Education lecturer, ICT teacher at SMP Negeri 15 Yogyakarta, and ICT teacher at MTs Muhammadiyah Karangkajen.

Table 3. Results of the Media Expert Questionnaire Calculation

No.	Assessment	Score	Qualitative Criteria
1.	Mathematics Education Lecturer	143	Very good
2.	Middle school ICT teacher	104	Good
3.	ICT Teachers MTs	132	Very good
	amount	379	
	Average	126,33	Very good

Table 3 shows that the module in terms of media eligibility included in the criteria very well means the module is suitable for learning mathematics. The quality of learning modules is based on aspects of student responses is in Table 4.

Table 4. Results of Calculation of Questionnaire Responses for Small Class Trial Students

No.	School name	Score	Qualitative Criteria
1.	SMP Negeri 15 Yogyakarta	140,8	Very good
2.	MTs Muhammadiyah Karangkajen	123,4	Good
	Average	132,1	Very good

Table 5. Results of Calculation of Questionnaire for Student Response in Large Class Trial

No.	School name	Score	Qualitative Criteria
1.	SMP Negeri 15 Yogyakarta	133,73	Very good
2.	MTs Muhammadiyah Karangkajen	126,37	Very good
	Average	132,1	Very good

Table 5 indicates that the module in terms of the feasibility of student responses included in the criteria very well means the module is suitable for learning mathematics.

CONCLUSION

Based on the results of research on the development of mathematics modules in rectangular and triangular material for VII grade students of SMP / MTs based on the 2013 curriculum, the following conclusions are obtained:

1. This development research was carried out using the ADDIE development model with Analysis, Design, Development, Implementation, and Evaluation.
2. Relating to the feasibility of rectangular and triangle material mathematics modules for grade VII students of SMP / MTs based on the 2013 curriculum.
3. The feasibility of rectangular and triangle material mathematics modules for VII grade students of SMP / MTs based on the 2013 curriculum was developed based on the average calculation of material experts at 136.67 and included in the excellent category.
4. The feasibility of rectangular and triangle material mathematics modules for VII grade students of SMP / MTs based on the 2013 curriculum was developed based on an average calculation from media experts of 126.33 and included in the excellent category.
5. The feasibility of rectangular and triangle material mathematics modules for grade VII students of SMP / MTs based on the 2013 curriculum developed based on the average calculation of student questionnaire responses of 132.2, trial II of 130.05, and average student responses of 131,13 and included in the excellent category.

6. Thus, the rectangular and triangle material mathematics modules for VII grade students of SMP / MTs based on the 2013 curriculum are suitable for the learning process.

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